

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark
Office
(Box PCT)
Crystal Plaza 2
Washington, DC 20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 11 February 1999 (11.02.99)	
International application No. PCT/GB98/01916	Applicant's or agent's file reference HCM/DLR/C149.02/0
International filing date (day/month/year) 01 July 1998 (01.07.98)	Priority date (day/month/year) 09 July 1997 (09.07.97)
Applicant MAHERS, Eric, Gordon et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:21 December 1998 (21.12.98)☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer R. E. Stoffel Telephone No.: (41-22) 338.83.38
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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference HCM/DLR/C149.02/0	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB98/01916	International filing date (day/month/year) 01/07/1998	Priority date (day/month/year) 09/07/1997
International Patent Classification (IPC) or national classification and IPC C12M1/34		
Applicant OXOID LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 7 sheets, including this cover sheet.

- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 5 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 21/12/1998	Date of completion of this report 19. 10. 99
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Luis Alves, D Telephone No. +49 89 2399 8695 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB98/01916

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

Description, pages:

2-19	as originally filed		
1	as received on	25/08/1999 with letter of	23/08/1999

Claims, No.:

1-18	as received on	25/08/1999 with letter of	23/08/1999
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Drawings, sheets:

1/4-4/4	as originally filed
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2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB98/01916

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-18
	No: Claims
Inventive step (IS)	Yes: Claims
	No: Claims 1-18
Industrial applicability (IA)	Yes: Claims 1-18
	No: Claims

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB98/01916

Reference is made to the following documents:

D1:	US-A-5 618 729
D2:	EP-A-0 640 826
D3:	US-A-4 403 339

Section V:

1. D1, which is considered to represent the closest prior art with regard to present claims 12 and 18, discloses a system for determining the radius of the inhibition zone surrounding each of several antibiotic disks on a plate. The system comprises a video camera and an image analyser capable of determining the location of each disk on the plate and determining the radius of the inhibition zone. Each disk is identified (associated with the respective antibiotic) by its relative position on the plate, that is, the image of the plate is compared with a template and the angle of rotation of the image with regard to the template is determined (see abstract and column 5, second paragraph).
 - 1.1 D1 does not disclose means to identify orientation means on the disk nor does it disclose means to read a code on the disk. Therefore, the subject-matter of claims 12 and 18, and dependent claims 13 to 17 is novel with regard to the prior art cited in the international search report (Article 33(2) PCT).
 - 1.2. Claim 12 concerns an image analysis system for identifying susceptibility test devices on a plate.

The problem to be solved by claim 12, in view of the closest prior art disclosed in D1, may be seen as the provision of an identification system which does not rely on the relative position of the devices on the plate.

D2 provides a solution to the problem posed in that each of a plurality of devices (vials) is identified automatically by reading a bar code on the device.

The bar code printed on the vial may have a linear pattern. The system comprises

camera means and a computer with means to locate the bar code on the vial and read the bar code. Hence the system comprises means for determining the optimal reading direction. The position of the system with regard to the vial may be adjusted, based on the location of the bar code determined by the system, in order to bring the system into the appropriate position for reading (see column 11, ln.56 to column 13, ln.21).

Thus, it appears obvious to introduce the identification means disclosed in D2 into the system disclosed in D1 in order to solve the problem posed, thereby arriving at the subject-matter of present claim 12 (Article 33(3) PCT).

- 1.3. Claim 18 concerns a system for identifying susceptibility test devices on a plate and determining the radius of the inhibition zone surrounding each device.

Document D1, which is considered to represent the closest prior art, concerns a system for the same purpose. Claim 18 is distinguished therefrom in the identification of the devices.

The problem to be solved by claim 18 may be seen as the provision of a system for identification of devices on a plate and measurement of the radius of the inhibition zone surrounding each device, which does not rely on the relative position of the devices on the plate.

As for claim 12, the subject-matter of claim 18 does not appear to involve an inventive step in view of D1 in combination with D2 (Article 33(3) PCT).

- 1.4. Since the features in dependent claims 13, 15 and 16 are already disclosed in D1 for the same purpose (see abstract and figure 2), the subject-matter of said claims is not rendered inventive by these additional features (Article 33(3) PCT).
- 1.5. An expert system is a known feature of information processing means. Since this feature is known per se it does not render inventive the subject-matter of claim 14 (Article 33(3) PCT).

- 1.6. The subject-matter of claim 17 does not seem to involve an inventive step (Article 33(3) PCT) because the use of orientation means as defined in the claim are well known, for example from D3.

D3 discloses an image analysis system for reading characters on a label carried by an object. The image of the object is scanned and the location of the label determined. The orientation of a bar code on the label is determined and used to adjust the reading position appropriate for the characters (see column 7, line 41 to column 8, line 29 and figure 2).

2. The closest prior art with regard to present claim 1 is considered to be represented by D1. This document discloses antibiotic disks for antibiotic susceptibility tests. It does not disclose disks comprising machine readable information. Thus, the subject-matter of claim 1 and dependent claims 2 to 11 is novel with regard to the documents cited in the International search report (Article 33(2) PCT).

However, the subject-matter of claim 1 does not seem to involve an inventive step over D1 in view of D2. The problem to be solved by claim 1 may be seen as the provision of antibiotic carrying devices which can be identified regardless of their position.

For the same reasons as in point 1.2 above, the solution to the posed problem appears to be obvious from D1. Thus, the subject-matter of claim 1 does not comply with the requirements of Article 33(3) PCT.

The subject-matter of claims 5, 7 and 11 also appears to lack an inventive step in view of D1 taken in combination with D2 (Article 33(3) PCT). The features in claim 5 are disclosed in D1 and the features in claim 7 are disclosed in D2, as discussed above. The feature in claim 11 is an obvious purpose of the information to be read. The features in claims 2 to 4, 6, and 8 to 10 are also well known in identification of products by image analysis (see for example D3, abstract, figure 2 and column 7, line 41 to column 8, second paragraph) so that they do not render the subject-matter of said claims inventive (Article 33(3) PCT).

Section VII:

1. Independent claims 12 and 18 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in a preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in a characterising part (Rule 6.3(b)(ii) PCT).
2. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 to D3 is not mentioned in the description, nor are these documents identified therein.

Section VIII:

1. Claim 6 appears to relate effectively to the same subject-matter as claims 2 and 3 and to differ from said claims only with regard to the definition of the subject-matter for which protection is sought. The aforementioned claims therefore lack conciseness. Moreover, lack of clarity of the claims as a whole arises, since the plurality of claims makes it difficult, if not impossible, to determine the matter for which protection is sought, and places an undue burden on others seeking to establish the extent of the protection.
Hence, claims 2, 3 and 6 do not meet the requirements of Article 6 PCT.
2. In claim 18, the expression "to interpret any region of visibly ... in the vicinity of a susceptibility testing device" is vague and introduces a lack of clarity into said claim (Article 6 PCT). Instead the operations to be performed should be defined.
3. The embodiment in the description on page 6, last paragraph to page 7, line 3, does not fall within the scope of the claims. This inconsistency between the claims and the description leads to doubt concerning the matter for which protection is sought, thereby rendering the claims unclear (Article 6 PCT).

IMAGE ANALYSIS SYSTEMS AND DEVICES
FOR USE THEREWITH

FIELD OF THE INVENTION

This invention relates to image analysis in the reading of information, such as reagent codes, especially but not exclusively in the context of devices used in antibiotic susceptibility testing of micro-organisms.

BACKGROUND TO THE INVENTION

For many years, antibiotic susceptibility testing ("AST") has been used as a means for identifying particular groups or species of micro-organisms, or for identifying an antibiotic type or dose level most appropriate for dealing with a clinical infection. An internationally recognised standard procedure has been evolved using carrier devices, usually in the form of membrane disks, impregnated with known amounts of specific antibiotics. These disks are used in conjunction with Petri-dish plates containing a layer of growth medium, such as agar gel, to which a material containing micro-organisms is applied. An arrangement of individual disks containing different amounts or types of antibiotics are placed on the gel surface at spaced intervals. Usually 6 or 8 disks are placed in a circular array on the Petri-dish. The disks are normally of paper or other porous sheet material. The antibiotic diffuses out of each disk into the surrounding growth medium and establishes a radial concentration gradient around the disk. The relative susceptibility of the micro-organisms to the antibiotic is revealed by the diameter of the zone surrounding the disk within which growth of the micro-organisms is inhibited. The detailed morphology of the zone can be indicative of the species or genus of micro-organism present. Visual interpretation of the results therefore requires considerable experience and

Claims

1. A carrier device for use in an antibiotic susceptibility test ("AST"), the device carrying a substance related to the test, and bearing machine readable information on the substance, wherein the device also includes orientation means for enabling an image analyser to determine an optimal reading direction of the readable information.
2. A device according to claim 1, in which the orientation means comprises means other than said machine readable information.
3. A device according to claim 2, in which the orientation means is separate from said machine readable information.
4. A device according to any of claims 1 to 3, in which the machine readable information comprises a code of one or more characters, whereby an image analyser comprising code reading means, can determine the orientation of the code, using the orientation means, and can adjust the orientation of the code, or an image thereof, to bring the perceived orientation into alignment with that necessary for proper reading of the code.
5. A device according to any of the preceding claims, in which the device comprises an AST disk.
6. A device according to any of the preceding claims, in which the orientation means comprises an arrangement of information presented on the device surface, in addition to the readable information.
7. A device according to any of the preceding claims in which said orientation means comprises linearly-arranged information.

8. A device according to claim 7, wherein said linearly-arranged information is parallel to the optimal reading direction of the readable information.

9. A device according to claim 7 or claim 8, wherein said linearly-arranged information is a printed line or lines, printed below or above the readable information.

10. A device according to claim 4, wherein said orientation means comprises an underline printed beneath the multi-character code.

11. A device according to any of the preceding claims, in which said machine readable information or character code identifies said substance and/or its concentration.

12. An image analysis system for interpreting AST plates, each of which holds a plurality of devices each in accordance with any of the preceding claims, the system comprising:

support means for supporting an AST plate;

camera means for imaging a plate supported by said support means; and

electronic information processing means, preferably a neural net, linked to said camera means, programmed or trained to;

locate an AST carrier device on said plate,

identify orientation means on the located carrier device, and rotate the perceived image of the located device as required so that the perceived image of a multi-character code printed on the device is brought into alignment with a proper reading direction for the code, and

read the code.

13. An image analysis system according to claim 12, which additionally determines a visible characteristic of the zone of inhibition, if any, surrounding the disk.

14. An analysis system according to claim 13, wherein the electronic information processing means includes or is linked to an 'expert system' comprising a database of AST characteristics of known micro-organisms.

15. An analysis system according to claim 13 or claim 14, including display means for displaying the disk image.

16. An analysis system according to any one of claims 13 to 15, wherein the diameter of the zone of inhibition is determined.

17. An analysis system according to any one of claims 13 to 16, wherein the orientation means comprises an underline printed beneath the multi-character code.

18. An image analyser for use in determining the result of susceptibility testing of micro-organisms on a culture medium, comprising:

a) camera means for viewing the culture medium;

b) electronic information processing means, linked to said camera means, programmed or trained to interpret any region of visibly altered micro-organism growth in the vicinity of a susceptibility testing device, such as a disk, present on the culture medium, wherein said processing means is also programmed or trained to read a character code on the device indicative of the susceptibility reagent in the device and to interpret orientation means incorporated in or on the device by which the optimal reading direction of the character code

can be recognised, and to adjust as necessary the actual reading direction to bring this into line with the actual orientation of the character code on the device.

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IMAGE ANALYSIS SYSTEMS AND DEVICES
FOR USE THEREWITH

FIELD OF THE INVENTION

This invention relates to image analysis in the reading of information, such as reagent codes, especially in the context of devices used in antibiotic susceptibility testing of micro-organisms.

BACKGROUND TO THE INVENTION

For many years, antibiotic susceptibility testing ("AST") has been used as a means for identifying particular groups or species of micro-organisms, or for identifying an antibiotic type or dose level most appropriate for dealing with a clinical infection. An internationally recognised standard procedure has been evolved using carrier devices, usually in the form of membrane disks, impregnated with known amounts of specific antibiotics. These disks are used in conjunction with Petri-dish plates containing a layer of growth medium, such as agar gel, to which a material containing micro-organisms is applied. An arrangement of individual disks containing different amounts or types of antibiotics are placed on the gel surface at spaced intervals. Usually 6 or 8 disks are placed in a circular array on the Petri-dish. The disks are normally of paper or other porous sheet material. The antibiotic diffuses out of each disk into the surrounding growth medium and establishes a radial concentration gradient around the disk. The relative susceptibility of the micro-organisms to the antibiotic is revealed by the diameter of the zone surrounding the disk within which growth of the micro-organisms is inhibited. The detailed morphology of the zone can be indicative of the species or genus of micro-organism present. Visual interpretation of the results therefore requires considerable experience and

AMENDED SHEET

C149.02/O

Claims

1. A carrier device for use in an antibiotic susceptibility test ("AST"), the device releasably carrying an antibiotic related to the test, and bearing machine readable information concerning the antibiotic, wherein the device also includes orientation means for enabling an image analyser to determine an optimal reading direction of the readable information.
2. A device according to claim 1, in which the orientation means comprises means other than said machine readable information.
3. A device according to claim 2, in which the orientation means is separate from said machine readable information.
4. A device according to any of claims 1 to 3, in which the machine readable information comprises a code of one or more characters, whereby an image analyser comprising code reading means, can determine the orientation of the code, using the orientation means, and can adjust the orientation of the code, or an image thereof, to bring the perceived orientation into alignment with that necessary for proper reading of the code.
5. A device according to any of the preceding claims, in which the device comprises an AST disk.
6. A device according to any of the preceding claims, in which the orientation means comprises an arrangement of information presented on the device surface, in addition to the readable information.
7. A device according to any of the preceding claims in which said orientation means comprises linearly-arranged information.

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8. A device according to claim 7, wherein said linearly-arranged information is parallel to the optimal reading direction of the readable information.

9. A device according to claim 7 or claim 8, wherein said linearly-arranged information is a printed line or lines, printed below or above the readable information.

10. A device according to claim 4, wherein said orientation means comprises an underline printed beneath the character code.

11. A device according to any of the preceding claims, in which said machine readable information or character code identifies said substance and/or its concentration.

12. An image analysis system for interpreting AST plates, each of which holds a plurality of devices each in accordance with any of the preceding claims, the system comprising:

support means for supporting an AST plate;

camera means for imaging a plate supported by said support means; and

electronic information processing means, preferably a neural net, linked to said camera means, programmed or trained to

locate an AST carrier device on said plate from among the plurality of AST carrier devices,

identify orientation means on the located carrier device, and rotate the perceived image of the located device as required so that the perceived image of a multi-character code printed on the device is brought into alignment with a proper reading direction for the code, and

read the code.

13. An image analysis system according to claim 12, which additionally determines a visible characteristic of the zone of inhibition, if any, surrounding the disk.

14. An analysis system according to claim 13, wherein the electronic information processing means includes or is linked to an 'expert system' comprising a database of AST characteristics of known micro-organisms.

15. An analysis system according to claim 13 or claim 14, including display means for displaying the disk image.

16. An analysis system according to any one of claims 13 to 15, wherein the diameter of the zone of inhibition is determined.

17. An analysis system according to any one of claims 13 to 16, wherein the system is programmed or trained to identify orientation means which comprises an underline printed beneath the multi-character code.

18. An image analyser for use in determining the result of susceptibility testing of micro-organisms on a culture medium, comprising:

a) camera means for viewing the culture medium;

b) electronic information processing means, linked to said camera means, programmed or trained to interpret any region of visibly altered micro-organism growth in the vicinity of a susceptibility testing device, such as a disk, present on the culture medium, wherein said processing means is also programmed or trained to read a character code on the device indicative of the susceptibility reagent in the device and to interpret orientation means incorporated in or on the device

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by which the optimal reading direction of the character code can be recognised, and to adjust as necessary the actual reading direction to bring this into line with the actual orientation of the character code on the device.

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference HCM/DLR/C149.02/0	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 98/ 01916	International filing date (day/month/year) 01/07/1998	(Earliest) Priority Date (day/month/year) 09/07/1997
Applicant OXOID LIMITED et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (see Box I).

2. ☐ Unity of invention is lacking (see Box II).

3. ☐ The international application contains disclosure of a **nucleotide and/or amino acid sequence listing** and the international search was carried out on the basis of the sequence listing

☐ filed with the international application.

☐ furnished by the applicant separately from the international application,

☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.

☐ Transcribed by this Authority

4. With regard to the **title**, ☒ the text is approved as submitted by the applicant

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this International Search Report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is:

Figure No. 3B ☐ as suggested by the applicant.

☐ None of the figures.

☒ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 98/01916

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 C12M1/34 C12M1/20 G06K9/32 G06K7/015

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 618 729 A (IZRAELEVITZ) 8 April 1997 see abstract see column 3, line 49 - line 58 see column 5, line 7 - line 25 see column 7, line 9 - line 48 see figures 1,2,6,8 ---	1,5,7, 11-13, 15,16,18
Y	EP 0 640 826 A (BECTON DICKINSON) 1 March 1995 see column 1, paragraph 1 see column 2, line 34 - line 56 see column 6, line 22 - line 37 see column 6, line 55 - column 7, line 5 see column 11, line 56 - column 12, line 28; figures 1,2,8,9 --- -/--	1,5,7, 11-13, 15,16,18

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

15 October 1998

Date of mailing of the international search report

22/10/1998

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 98/01916

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>US 4 403 339 A (WEVELSIEP) 6 September 1983</p> <p>see column 1, line 6 - column 2, line 10 see column 8, line 9 - line 28 see column 10, line 34 - line 41 see column 10, line 56 - column 12, line 5 see column 14, line 11 - line 24 see figures 2,6B,9</p> <p>---</p>	<p>1-3, 6-10,12, 17,18</p>
A	<p>US 5 103 489 A (MIETTE) 7 April 1992</p> <p>see column 2, line 22 - line 42 see column 3, last paragraph - column 4, line 33 see column 5, line 37 - line 43 see figures 1,2</p> <p>---</p>	<p>1-4,6, 12,18</p>
A	<p>US 3 701 098 A (ACKER) 24 October 1972</p> <p>see column 1, line 6 - line 27 see column 1, last paragraph - column 2, line 8 see column 4, last paragraph - column 5, line 17 see column 6, paragraph 1 - paragraph 3 see figures 1,3B,4</p> <p>---</p>	<p>1-3,6, 12,18</p>
A	<p>US 3 757 299 A (PERRY) 4 September 1973 see column 1, paragraph 1 - paragraph 2 see column 4, line 7 - line 39; figure 1</p> <p>-----</p>	<p>1,18</p>

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 98/01916

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5618729 A	08-04-1997	US 5629169 A WO 9612036 A	13-05-1997 25-04-1996
EP 0640826 A	01-03-1995	US 5397709 A AU 679078 B AU 7020394 A CA 2130014 A JP 7163394 A JP 8029116 B US 5595708 A	14-03-1995 19-06-1997 09-03-1995 28-02-1995 27-06-1995 27-03-1996 21-01-1997
US 4403339 A	06-09-1983	DE 2942747 A DE 3014350 A AT 7427 T AU 544354 B AU 6360080 A CA 1169149 A EP 0027594 A FI 803247 A JP 56082977 A	07-05-1981 22-10-1981 15-05-1984 23-05-1985 30-04-1981 12-06-1984 29-04-1981 24-04-1981 07-07-1981
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US 3701098 A	24-10-1972	NONE	
US 3757299 A	04-09-1973	NONE	